A mathematical model for the optimization of the non-metallic mining supply chain in the mining district of Calamarí-Sucre (Colombia)

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Abstract

This article presents a mathematical model of the Supply chain of non-metallic mining. The model considers uncertainty scenarios in materials, elements for capacity planning in a multilevel chain and with multiple products. The mathematical model is collaborative and maximizes the profits of the actors in the supply chain. The model is implemented in Calamarí-Sucre mining district (Colombia). The scenario is applied to the extraction, processing, storage, and distribution of limestone. To solve the model, the GAMS software was used through libraries of relaxed mixed nonlinear programming - RMINLP and the DICOPT solver. The results indicate that the greatest benefits occur in a scenario of the high provision of raw materials. The equity in the economic benefits show a dynamics of vertical integration in the sector. The model applied to non-metallic mining complexes helps determine optimal strategies and decisions in different echelons.

Keywords

Mathematical model, Mining supply, Calamarí-Sucre; Colombia